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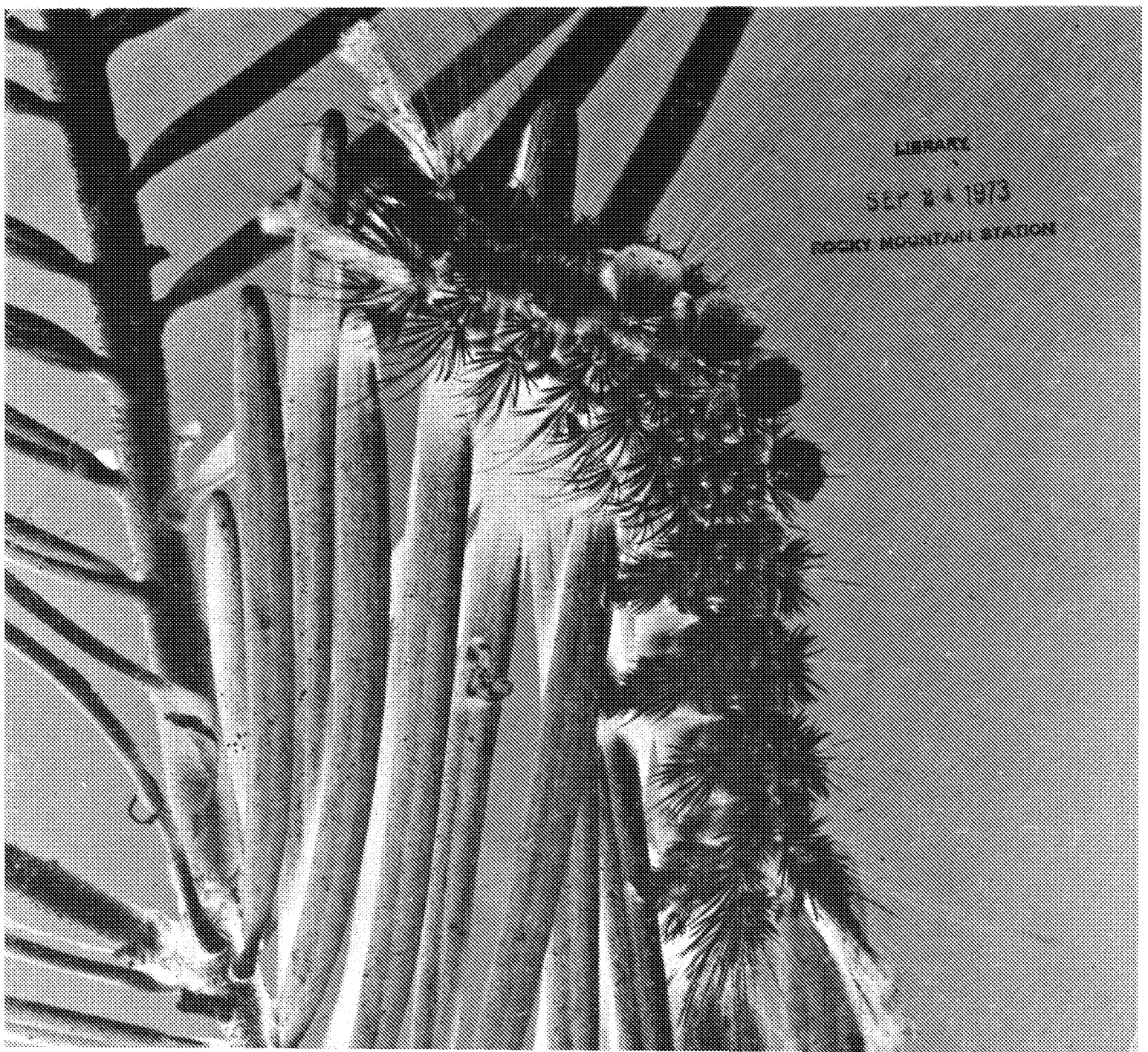
Forest Pest Conditions

In The Pacific Northwest

1972



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This is the 25th annual report of forest pest conditions in Oregon and Washington based on cooperative surveys sponsored by the Northwest Forest Pest Action Council. The combined efforts of many organizations and individuals made these surveys possible. Special acknowledgement is made to the principal cooperators, Oregon State Department of Forestry and Washington State Department of Natural Resources and the surveillance efforts of private, State, and Federal foresters.

COVER PHOTO:

Full-grown larvae of the Douglas-fir tussock moth, *Hemerocampa pseudotsugata* McD.

FOREST PEST CONDITIONS IN THE PACIFIC NORTHWEST

1972

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and

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APRIL 1973

INSECT AND DISEASE CONTROL BRANCH
DIVISION OF TIMBER MANAGEMENT
PACIFIC NORTHWEST REGION
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

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INTRODUCTION

Forest pest conditions were detected and evaluated by aerial and ground surveys made in cooperation with the Oregon State Department of Forestry and the Washington State Department of Natural Resources. Ground surveys were made to verify aerial survey findings, detect low-level pest populations, and to evaluate stand conditions and pest population trends.

The volume of timber killed by bark beetles, except for the pine engraver (= Oregon pine Ips), was estimated from counts of dead trees made during the aerial survey. Volume losses resulting from defoliators, sucking insects, pine engraver, and diseases were not estimated.

The extent of insect outbreaks is summarized in Table 1. Insect infestations are recorded by volume losses, land ownership and classification in Tables 2 and 3. Diseases are not summarized in tabular form.

CONDITIONS IN BRIEF

Bark beetle losses remained at about the same level as last year. Douglas-fir beetles caused considerable mortality in western Oregon and Washington. The most significant bark beetle damage in eastern Oregon resulted from mountain pine beetle damage in lodgepole pine. Most defoliating insects in Oregon and Washington had higher than normal populations. Although black-headed budworm populations peaked last year, there was considerable carry-over into this year. The Douglas-fir tussock moth demonstrated its periodic population explosion capability. A dramatic increase of this moth occurred in northeast Oregon and southeast Washington where the number of defoliated acres visible from the air expanded from zero in 1971 to nearly 200,000 acres in 1972. Spruce budworm populations also increased greatly in 1972. Over 200,000 acres of true fir and Douglas-fir were defoliated to varying degrees in central and north-central Washington.

Dwarf mistletoes continue to be the most important disease problem. The impact of diseases in forest nurseries is becoming increasingly significant. Several nurseries in Oregon and Washington reported preemergence and postemergence losses due to Pythium and Fusarium. Damaging outbreaks of foliage diseases occurred in several Christmas tree plantations in western Oregon and Washington.

Table 1.—Summary of forest insect infestations in Oregon and Washington during 1971 and 1972

(In acres)

Insects[1/]	Oregon		Washington		Regional Total	
	1971	1972	1971	1972	1971	1972
Bark beetles:						
Douglas-fir beetle (western)	16,460	32,500	2,750	11,850	19,220	44,350
Douglas-fir beetle (eastern)	12,280	41,280	21,590	55,460	34,180	96,740
Spruce beetle	300	1,900	4,670	7,060	4,970	8,960
Fir engraver	134,770	45,320	26,410	3,820	161,180	49,140
Mountain pine beetle (L)	268,470	273,670	1,530	2,980	270,000	276,650
Mountain pine beetle (S)	480	470	0	0	480	470
Mountain pine beetle (P)	68,030	27,010	6,700	1,610	74,730	28,620
Mountain pine beetle (W)	64,990	40,600	24,140	42,400	89,130	83,000
Pine engraver	38,970	17,760	730	540	39,660	18,280
Western pine beetle	39,270	124,890	6,750	540	46,020	125,430
Silver fir beetles	20	0	1,100	1,130	1,120	1,130
All bark beetles	645,580	585,380	98,990	103,050	744,570	688,430
Defoliators:						
Beetles on Monterey pine	1,100	360	0	0	1,100	360
Western spruce budworm	89,200	21,030	18,260	202,470	44,460	223,500
Douglas-fir tussock moth	0	117,890	2,430	78,160	2,430	196,050
Pandora moth	0	3,880	0	0	0	3,880
Black-headed budworm	0	0	209,680	86,800	209,880	86,800
Spruce budworm (green form)	0	5,810	0	0	0	5,810
Larch budworm	0	0	880	0	880	0
All defoliators	29,300	150,970	231,450	365,430	260,750	516,400
Sucking insects:						
Balsam woolly aphid	96,620	58,350	18,010	17,680	114,630	82,030
Spruce aphid	0	0	200	0	200	0
All sucking insects	96,620	58,350	18,210	17,680	114,830	82,030
All insects	771,500	806,730	358,650	486,160	1,131,150	1,286,890

[1/] Mountain pine beetle infestations are separated by tree species: L, lodgepole pine; S, sugar pine, W, western white pine, P, ponderosa pine.

STATUS OF INSECTS

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae* Hopk.

Douglas-fir beetle killed an estimated 22 million board feet of Douglas-fir in Oregon and Washington. Almost 20 million of this mortality occurred in western Oregon and Washington. The heaviest concentrations of tree killing were observed in the Columbia River Gorge on the Mt. Hood National Forest in Oregon and the Gifford Pinchot National Forest in Washington where an ice storm in January 1970 caused extensive tree damage. The high tree mortality of 1972 is a result of high beetle broods that developed in this ice-damaged material during 1970 and 1971. Timber sales concentrated in areas of heaviest ice damage and beetle populations have done much to change the trend of this infestation. Biological evaluations indicate that the beetle population is now declining rapidly. Hence, little additional tree killing is expected in 1973. Losses east of the Cascade Mountains were lower than last year.

During the spring and summer of 1972, the repellency of the pheromone, methylcyclohexanone, was field-tested on susceptible Douglas-fir trees and logs in two test areas; one in Washington and the other in Oregon. Results of this cooperative project involving Regions One and Six, the Intermountain and Pacific Northwest Forest and Range Experiment Stations, and both States indicate that this chemical shows promise in reducing the number of beetle attacks on windthrown Douglas-fir trees.

SPRUCE BEETLE, *Dendroctonus rufipennis* (Kby.)

The spruce beetle continued to remain active in Engelmann spruce stands in the high elevations of Oregon and Washington. Much of the damage occurred in the Pasayten Wilderness area and other inaccessible areas of the Okanogan National Forest in Washington where an estimated 1 million board feet of timber was killed.

FIR ENGRAVER, *Scolytus ventralis* LeC.

Killing of true fir was scattered throughout the forests of eastern Oregon and Washington. Losses declined sharply from 45.9 million board feet reported in 1971 to 2.3 million board feet in 1972. Heaviest losses this year were in central Oregon on the Ochoco and Umatilla National Forests.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae* Hopk.

This beetle continues to cause serious problems in the lodgepole pine stands of central Oregon. The largest infestation center was in the upper drainages of the Grand Ronde River on the La Grande Ranger District, Wallowa-Whitman National Forest, where an estimated 24.8 million board feet of timber was killed. Elsewhere in Oregon, significant lodgepole pine killing also occurred on the Deschutes, Fremont, Umatilla, and Winema National Forests and Crater Lake National Park. In Washington, damage was very light and widely scattered. Mountain pine beetle attacks in western white pine stands continued throughout the Cascade Mountain Range. The majority of the losses still occur in the high elevation roadless areas on the Mt. Hood and Willamette National Forests in Oregon and the Snoqualmie National Forest in Washington. Tree killing in young ponderosa pine stands was widely scattered throughout eastern Oregon and Washington with no significant outbreaks developing in 1972. Losses are expected to continue high for the next several years in both lodgepole and western white pine stands.

WESTERN PINE BEETLE, *Dendroctonus brevicomis* LeC.

Western pine beetle infestations increased in mature and overmature ponderosa pine stands in central Oregon on the Ochoco, Fremont, and Malheur National Forests. In Washington, aerial observers discovered only four small infestation centers. No major changes in levels of tree killing are expected to occur next year in either State. During the summer of 1971, a severe windstorm blew down over 100 MM board feet of ponderosa pine on the Ochoco National Forest. Most of this material was salvaged before the 1972 spring beetle flight. This prompt action prevented a large-scale western pine beetle population buildup in the affected stands.

Table 2.—Summary of 1972 infestations in Oregon and Washington for all bark beetle damage excluding pine engraver

Species[1/]	National Forest lands[2/]		Forest lands other than National Forests[3/]		Unallocated forest lands (Wild areas & National Parks)[4/]		All forest lands	
	Area	Volume	Area	Volume	Area	Volume	Area	Volume
	Acres	MBF	Acres	MBF	Acres	MBF	Acres	MBF
Oregon:								
Douglas-fir beetle (westside)	27,360	5,781	13,660	3,235	280	50	41,280	14,067
Douglas-fir beetle (eastside)	10,240	1,020	2,220	478	0	0	12,570	1,730
Spruce beetle	1,130	92	680	79	280	18	1,990	196
Fir engraver	28,440	3,288	14,820	837	1,060	52	45,320	2,177
Mountain pine beetle (L)	210,590	30,532	50,370	8,619	11,120	1,760	272,870	42,651
Mountain pine beetle (J)	630	7	40	5	0	0	670	12
Mountain pine beetle (W)	12,990	1,841	5,870	1,466	12,060	6,319	40,920	15,480
Mountain pine beetle (P)	12,899	286	14,130	462	28	1	27,056	279
Western pine beetle	102,270	6,941	21,900	758	730	32	124,940	8,776
Oregon total	446,630	49,813	130,870	20,739	25,560	10,112	587,460	79,764
Washington:								
Douglas-fir beetle (westside)	16,600	3,975	6,760	1,993	120	9	23,480	5,882
Douglas-fir beetle (eastside)	2,540	593	8,419	978	200	11	11,159	1,582
Spruce beetle	2,710	385	110	7	1,220	635	4,040	1,027
Fir engraver	850	62	1,440	76	1,360	96	3,650	234
Mountain pine beetle (L)	1,420	25	960	125	180	9	2,560	159
Mountain pine beetle (W)	20,930	11,358	12,600	1,079	6,870	365	42,400	13,102
Mountain pine beetle (P)	280	3	1,030	13	0	0	1,410	16
Western pine beetle	0	0	260	12	0	0	260	12
Silver fir beetle	4,370	266	1,880	85	1,300	58	7,550	408
Washington total	54,450	16,867	35,410	4,378	12,650	1,164	102,509	22,471
Regional total	475,480	66,960	166,280	25,507	48,290	11,258	670,159	101,723

[1/] Mountain pine beetle infestations are separated by tree species: L, lodgepole pine; J, sugar pine; W, western white pine; P, ponderosa pine

[2/] Excluding Wilderness areas. The volume that will be salvaged depends upon land use classification, accessibility, and other conditions.

[3/] Includes all forested lands not within the boundaries of National Forests or National Parks.

[4/] Includes only Wilderness areas of the National Forest system and National Parks.

WESTERN SPRUCE BUDWORM, *Choristoneura occidentalis* Free.

Defoliation by this pest is again reaching serious levels after several years of little or no visible defoliation. In Washington, on the Okanogan and Wenatchee National Forests, the defoliation increased from 18,000 acres in 1971 to over 200,000 acres in 1971. Top killing is occurring in some of the most heavily defoliated areas. Much of the defoliation is occurring in roadless drainages and high elevations. The outbreak on the Wallowa-Whitman National Forest in Oregon continues, but the size and intensity of defoliation decreased. In all forests of Oregon and Washington, western spruce budworm larvae are commonly encountered on defoliator monitoring plots. All outbreaks are being monitored to determine the trend of the budworm population. Defoliation is expected to continue, however, no control is planned for 1973. Historically, control is not needed until after 3 to 5 years of continuous feeding by the budworm.

SPRUCE BUDWORM, *Choristoneura viridis* Free.

This budworm, often referred to as the "green form," reappeared in the Warner Mountains on the Fremont National Forest in southern Oregon. Light to moderate defoliation was detected on 5,810 acres. No control is planned for 1973.

WESTERN BLACK-HEADED BUDWORM, *Acleris gloverana* Wishm.

The high populations of the black-headed budworm have declined in Washington. Only minor defoliation of western hemlock occurred in 1972 on the Olympic Peninsula and the Mt. Baker and Gifford Pinchot National Forests where heavy to severe defoliation was reported in 1971. This year, moderate defoliation increased on the Snoqualmie and Wenatchee National Forests. No defoliation occurred in Oregon. Populations are expected to decline next year. The only significant damage resulting from this outbreak has been scattered top-kill of western hemlock in the most heavily defoliated areas on the Olympic Peninsula.

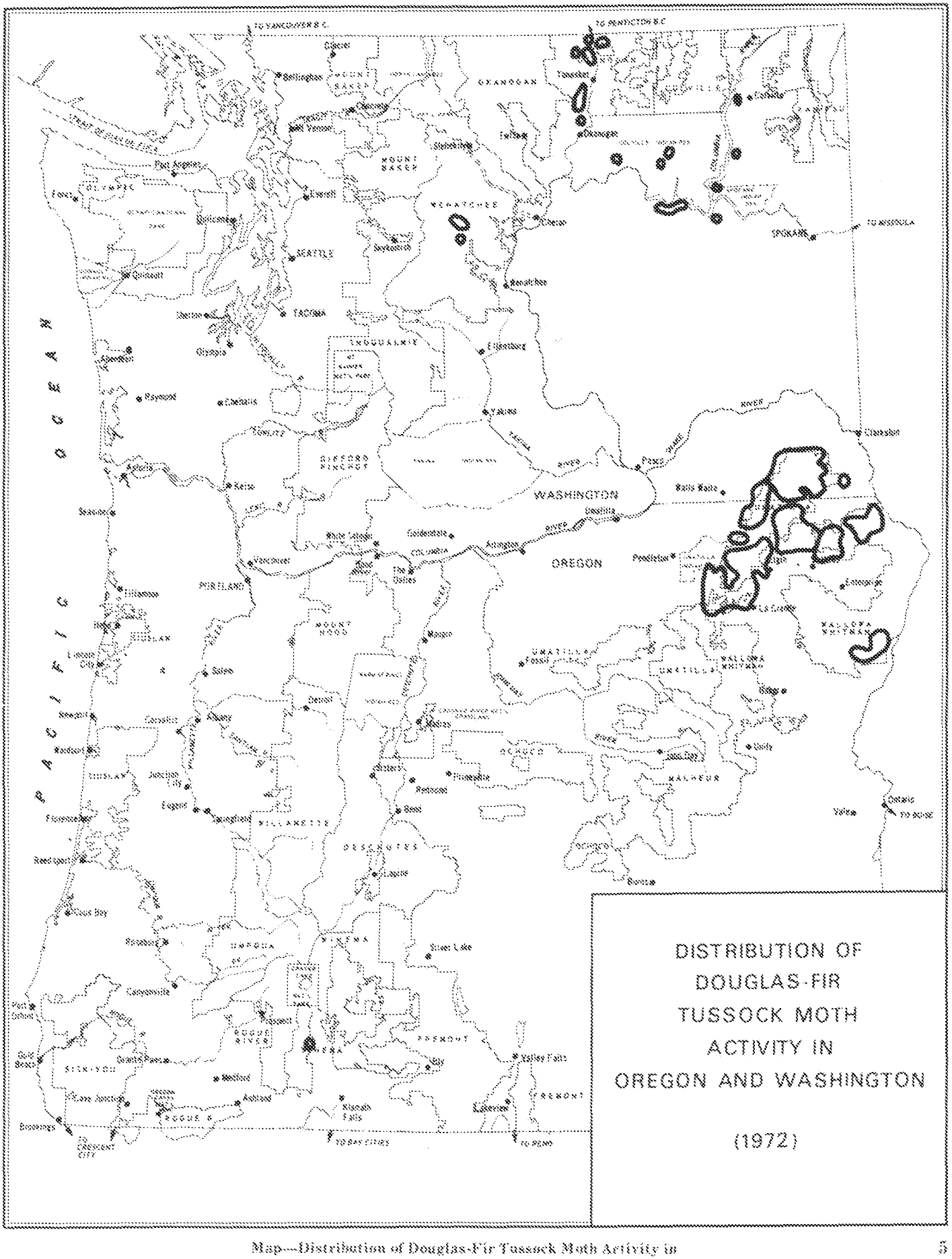
LARCH CASEBEARER, *Coleophora laricella* Hbn.

Larch casebearer continues to spread in the Wallowa and Blue Mountains of northeast Oregon and southeast Washington. The spread of this moth is expected to continue until all larch stands in both States are infested. In northeast Washington, all larch stands have been infested for several years. The casebearer has not been found in the Cascade Mountains of either State. Little, if any, mortality has occurred in Oregon or Washington from casebearer defoliation, but estimates of growth reduction in heavily defoliated trees range from 70 to 95 percent. Parasite releases were made for the first time in northeast Oregon and southeast Washington. Adults of *Dieladocerus westwoodii* West. and *Agathis pumila* (Ratz.) were released on or near the Umatilla National Forest at two locations, Charlie Creek drainage, Pomeroy Ranger District and at Emigrant Springs State Park on Interstate 80.

DOUGLAS-FIR TUSSOCK MOTH, *Hemerocampa pseudotsugata* McD.

Populations of this moth have reached serious levels over much of eastern Oregon and Washington. Throughout the infested area, tussock moth larvae were collected at several monitoring plots in June 1972 indicating higher than normal populations. During aerial detection surveys in late July, a total of 196,050 acres of defoliation were visible from the air. In the Blue Mountains of northeast Oregon and southeast Washington where the largest infestation center was discovered, light to heavy defoliation occurred on 173,600 acres of Douglas-fir and true fir. Significant tree mortality was observed on 10,670 acres. Fall egg surveys indicate that the 1973 population may be larger and that up to 400,000 acres may be defoliated to some degree. In north central and northeast Washington, light to heavy defoliation was detected on 4,850 acres. The outbreaks occurred in small scattered patches on the Wenatchee and Okanogan National Forests, Colville Indian Reservation, and on State and private lands in Okanogan, Lincoln, and Stevens Counties. Fall egg counts indicate the population trend in these areas will be variable. Visible defoliation is expected to occur on about 20,000 acres in 1973.

During the summer of 1972, two insecticides, Zectran and pyrethrin were field-tested as DDT substitutes for control of the Douglas-fir tussock moth. This was a cooperative project with the Insecticide Evaluation Project, Pacific Southwest Forest and Range Experiment Station, Berkeley, California, and the Aerial Applications Project, Pacific Northwest Forest and Range Experiment Station, Corvallis, Oregon. Zectran results were encouraging, but more tests are needed before it can be recommended for operational control.



Map—Distribution of Douglas-Fir Tussock Moth Activity in Oregon and Washington (1972)

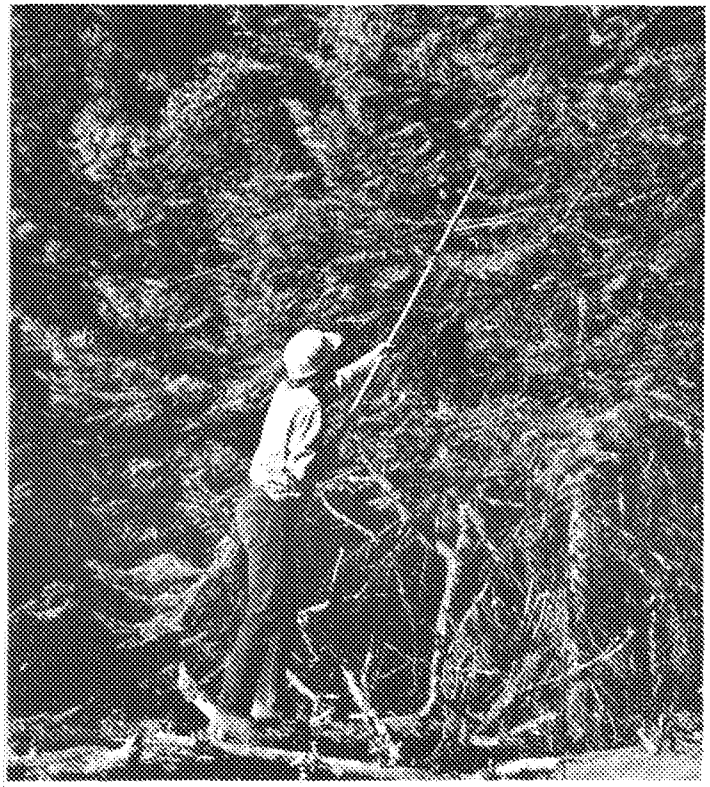


Figure 1.—Sampling Douglas-fir tussock moth populations from infested trees.

Figure 2.—Douglas-fir trees heavily defoliated and killed in one season by the Douglas-fir tussock moth.

BALSAM WOOLLY APHID, *Adelges piceae* (Ratz.)

Infestations of this insect were little changed from last year. This past year some mortality of subalpine, Pacific silver, and grand fir occurred on 82,000 acres in Oregon and Washington. Most damage in Oregon was on the Mt. Hood, Rogue River, Umpqua, and Willamette National Forests. In Washington, most damage was on the Gifford Pinchot and Snoqualmie National Forests. The recent infestation on the Olympic Peninsula of Washington expanded from 600 acres in 1971 to over 900 acres in 1972.

Table 3.—Summary of 1972 infestations for all defoliators, sucking insects, and pine engraver in Oregon and Washington.

Insect	National Forest lands[1/]	Forest lands other than National Forests[2/]	Dedicated Forest lands (Wild areas & National Parks)[3/]	All forest lands
	Acres affected	Acres affected	Acres affected	Acres affected
Oregon:				
Sawflies on ponderosa pine	360	0	0	360
Western spruce budworm	33,250	1,280	0	34,530
Spruce budworm (grand fir form)	5,530	280	0	5,810
Douglas-fir tussock moth	79,815	38,275	0	117,890
Pandora moth	2,880	0	0	2,880
Balsam woolly aphid	82,370	5,990	1,080	88,360
Pine engraver	9,090	8,690	0	17,780
Oregon total	172,975	54,695	1,080	230,990
Washington:				
Western spruce budworm	167,660	26,960	8,300	202,920
Black-headed budworm	56,390	27,750	640	84,590
Douglas-fir tussock moth	54,720	23,430	0	78,150
Balsam woolly aphid	12,230	3,440	1,990	17,660
Pine engraver	0	560	0	560
Washington total	290,860	82,160	10,930	383,910
Regional total	463,835	136,855	12,010	614,900

1/ Excluding Wilderness areas.

2/ Includes all forested lands not within the boundaries of National Forests or National Parks.

3/ Includes only Wilderness areas of the National Forest system and National Parks.

WESTERN PINE-SHOOT BORER, *Eucosma sonomana* Kearf.

This moth is a native insect which attacks laterals and terminals of young ponderosa and lodgepole pines. In 1972, two ponderosa pine plantations were selected to measure current terminal growth impact. One plantation was located on the Ochoco National Forest and the other on the Winema National Forest in central Oregon. The results, using paired tree plots, indicated the borer caused a 1.3-inch growth reduction on the Ochoco plantation and none on the Winema plantation. The Ochoco plantation had a site index of 71 as compared to 84 on the Winema plantation. Additional impact evaluations are planned.

SILVER FIR BEETLES, *Pseudohylesinus* spp.

Silver fir beetles caused scattered tree killing of true firs on the Mt. Baker National Forest and at scattered localities on the Olympic Peninsula in western Washington. No tree killing by this beetle was observed in Oregon.

PINE ENGRAVER, *Ips pini* Say.

This bark beetle caused minor damage in young ponderosa pine stands. Most damage was in eastern Oregon; while eastern Washington, as has been the case in the past few years, had very little damage.

SAWFLIES, *Neodiprion* spp.

Sawflies caused light defoliation of knobcone pine on the Siskiyou National Forest in southwestern Oregon.

PANDORA MOTH, *Colorudia pandora* Blake.

Second-year larvae of this moth caused light to heavy defoliation on nearly 4,000 acres of ponderosa and lodgepole pine on the Deschutes National Forest in central Oregon. The population overwintered in the pupal stage. The adult moths will emerge in the summer of 1973 to mate and lay eggs. Control was not recommended.

CALIFORNIA TORTOISE-SHELL BUTTERFLY, *Nymphalis californica* (Bdv.)

High populations were common throughout Oregon and Washington this past summer. Snowbrush ceanothus, *ceanothus velutinus* Dougl., the principal host, was completely defoliated at several locations.

EUROPEAN PINE SHOOT MOTH, *Rhyacionia buoliana* (Schiff.)

New infestations were discovered in a nursery in Multnomah County, Oregon, during the spring detection survey. After destroying all infested trees, fall surveys showed no remaining or new infestations.

STATUS OF DISEASES

DWARF MISTLETOES, *Arceuthobium* spp.

Dwarf mistletoes continue to be a major cause of growth loss and mortality in the Pacific Northwest. In 1972 intensive and extensive surveys for dwarf mistletoes were conducted on 460,000 acres. The information collected from these surveys is used to prepare resource plans designed to lessen the mistletoe impact. Suppression with Insect & Disease Control funds was accomplished on 12,400 acres. The efficiency of mistletoe evaluation surveys has been increased by collecting data on mistletoe infestations during stand examinations. This approach enables silviculturists to make prescriptions for the stand as a whole, taking into account the mistletoe-infested and disease-free areas. Treatment of infested stands is achieved as an integral part of normal stand management.

Efforts to learn more about the biology and impact of dwarf mistletoes in true fir, lodgepole pine, Douglas-fir and western hemlock stands are being expanded by the Pacific Northwest Region and the Pacific Northwest Forest and Range Experiment Station. An administrative study designed to measure the growth impact of dwarf mistletoe in thinned ponderosa pine stands was initiated in 1972.

LAMINATED ROOT ROT, *caused by Poria weirii* Murr.

Poria weirii is recognized as one of the most important problems in management of second growth Douglas-fir stands. A campground on the Gifford Pinchot National Forest was closed to overnight use primarily because of the potential hazard posed by Poria-infected trees. During the summer of 1972, several methods of estimating the impact of this serious root disease in west side Douglas-fir stands were tested. Impact estimates were attempted for three major forest resources, including timber, recreation, and wildlife. Further refinement of techniques is planned for next year.

Hopefully, this methodology can be adapted for use with other important root disease fungi, including *Fomes annosus* (Fr.) Cke. and *Armillaria mellea* (Vahl) Quel.

WHITE PINE BLISTER RUST, *Cronartium ribicola* Fischer.

Ribes spp. eradication, as a method of white pine blister rust control, has been completely phased out in Region 6 following a final evaluation completed in the spring of 1972. Blister rust-resistant western white pine and sugar pine developed by the Forest Service Tree Improvement Project at Dorena, Oregon, are being planted on several National Forests. Resistance testing is continuing at an accelerated pace. More than 50,000 seedlings were artifically inoculated with the fungus during the fall of 1972 as a part of the selection program. The future of blister rust-resistant western white pine and sugar pine looks very promising.

NEEDLE CAST OF SCOTS PINE, caused by *Lophodermium* spp.

The most spectacular diseases were reported in Scots pine Christmas tree plantings in several west side Oregon and Washington counties. One, and possibly two, species of *Lophodermium*, including *L. pinastri* (Schrad. ex Hook.) Chev., have caused severe defoliation of trees destined for the Christmas tree market. Some growers with a large amount of growing stock have

applied fungicides to prevent infection. The Rocky Mountain and Pacific Northwest Forest and Range Experiment Stations are studying the diseases. The incidence of diseases such as these will likely increase if growers continue to cultivate exotic, offsite species.

LEAF BLIGHT OF OREGON MYRTLE, *Umbellularia californica*, caused by several bacteria and fungi, including *Pseudomonas* sp., Kaba *tiella* sp., and *Colletotrichum* sp. resulted in severe defoliation of trees located in picnic areas and campgrounds in southwestern Oregon. Branch dieback has occurred on trees affected for two or more seasons. It appears likely that additional dieback will result from 1972 defoliation. The trend of this disease is unknown and no controls are available.

BYNUM'S BLIGHT, caused by *Lophodermella morbida* Staley.

This foliage disease of offsite ponderosa pine has caused substantial growth loss as a result of repeated defoliation; however, mortality is light. Tests of chemicals applied to foliage at the time of budbreak and continued at 2-week intervals until full needle length was reached indicated that 2 percent (W/V) Daconil 2787 provided the most effective protection. This treatment is not being recommended because the affected stands are gradually being replaced with species better adapted to the sites.

NURSERY DISEASES, caused by *Pythium* and *Fusarium* spp. have resulted in severe losses of ponderosa pine and lodgepole pine in the Bend Nursery. Fumigation using a methyl bromide-chloropicrin mixture (67 to 33 percent) in September 1971 significantly reduced the numbers of these fungi that could be isolated from the soil. The number of surviving seedlings was significantly better in fumigated beds than in unfumigated beds. Additional studies are planned to determine the long-term effects of this fumigant and other treatments on seedling growth and pathogenic fungi.

Frost injury to the terminal growth of 35 percent of the seedlings at the Wind River Nursery, Carson, Washington, was noted in March 1972. Only 2 percent of the seedlings were killed by frost or winter injury. The impact of frost was most noticeable on 1-0 stock and seed lot sources from lower elevations in southern Oregon.

An irrigation system has been installed to prevent future frost damage. An ice coating will be applied as a protective cover to the seedlings during frost periods.

RHIZINA ROOT ROT, *Rhizina undulata* Fr.

This disease has been detected by University of Washington students in about 50 of approximately 150 plantations surveyed in western Washington. Most of the damage has occurred on the White River Ranger District on the Snoqualmie National Forest. The presence of the disease is directly related to burning. Seedling loss occurs on areas planted within 1 to 2 years of burning. The fungus has been found commonly on Douglas-fir, noble fir, and western hemlock.

The University of Washington is conducting research on the biology of *R. undulata* and the epidemiology of the disease. A cooperative damage evaluation survey is planned for Oregon and Washington in 1973.

INCENSE CEDAR RUST, *Gymnosporangium libocedri* (P. Henn.), Kern.

This disease which causes a conspicuous killing of incense cedar foliage was observed in several locations on the Rogue River and Siskiyou National Forests in southwestern Oregon. The damage is of little consequence; whole trees are rarely killed.

MISCELLANEOUS DISEASES

Several canker fungi, including *Cytospora abietis* Sacc. and *Phomopsis* spp. caused terminal and branch dieback of Douglas-fir in plantations located in southwestern Oregon. Infected trees appeared to be predisposed to infection by frost, snow, or ice injuries.

OTHER FOREST INJURIES

WEATHER INJURY

January and March storms caused approximately 25 million board feet of blowdown on the Warm Springs Indian Reservation. Prompt salvage helped to reduce the incidence of blue staining and prevented a bark beetle outbreak from developing.

AIR POLLUTION

Damage caused by air pollutants has not been reported in commercial forest lands in Oregon and Washington. The detection effort by both States is oriented towards agronomic crops.

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The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

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